

AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions and listings of claims in the application. Applicants have amended Claims 1, 5, 7, 8, and 11 in the following, in which added text is underlined and deleted text is stricken through. Applicants have cancelled Claims 2 and 6.

1. (Currently amended) A method of measuring a distance using an ultrasonic wave, the method comprising steps of:

receiving through an ultrasonic sensor a signal from an ultrasonic transmitter;
amplifying the received signal;
filtering a high-frequency component from the amplified signal, thereby generating a filtered signal;

generating an output signal when the filtered signal satisfies a predetermined condition; and

computing a distance based on a period of the output signal,
wherein generating the output signal comprises:

comparing the filtered signal against an upper threshold and a lower threshold so as to provide the output signal, wherein the output signal has a lower level and an upper level;

wherein the output signal transitions from the lower level to the upper level when the filtered signal changes from below the upper threshold to above the upper threshold, and the output signal stays at the upper level when the filtered signal maintains above the lower threshold, and

wherein the output signal transitions from the upper level to the lower level when the filtered signal changes from above the lower threshold to below the lower threshold, and the output signal stays at the lower level when the filtered signal maintains below the upper threshold.

2. (Cancelled)

3. (Original) The method according to claim 1, wherein the step of amplifying the received signal carries out amplification in such a way that a noise except for an ultrasonic signal is unsaturated.

4. (Cancelled)

5. (Currently amended) An apparatus for measuring a distance using an ultrasonic wave, the apparatus comprising:

an ultrasonic transmitter ~~for transmitting~~ configured to transmit an ultrasonic wave;

a ~~means for transmitting~~ transmitter configured to transmit a synchronized signal in a cable or wireless mode in order to transmit an ultrasonic transmission signal;

an ultrasonic sensor ~~for receiving~~ configured to receive the ultrasonic signal transmitted from the ultrasonic transmitter;

an amplifier ~~for amplifying~~ configured to amplify the ultrasonic signal received by the ultrasonic sensor;

a filter ~~for filtering~~ configured to filter a high-frequency signal from the amplified signal of the amplifier, thereby generating a filtered signal;

a comparator ~~for outputting~~ configured to output an output signal when the filtered signal has a predetermined condition; and

a processing unit ~~for computing~~ configured to compute a distance value based on a period of the output signal,

wherein the comparator compares the filtered signal against an upper threshold and a lower threshold so as to provide the output signal, wherein the output signal has a lower level and an upper level,

wherein the output signal transitions from the lower level to the upper level when the filtered signal changes from below the upper threshold to above the upper threshold, and the output signal stays at the upper level while the filtered signal maintains above the lower threshold; and

wherein the output signal transitions from the upper level to the lower level when the filtered signal changes from above the lower threshold to below the lower threshold,

and the output signal stays at the lower level while the filtered signal maintains below the upper threshold.

6. (Cancelled)

7. (Currently amended) The apparatus according to claim 5, wherein the processing unit includes:

~~means for monitoring a first unit configured to monitor the output signal, which comprises a plurality of pulses; and~~

~~means for determining a second unit configured to determine that an expected ultrasonic signal has arrived when at least predetermined number of pulses having a substantially similar width are identified; and~~

~~means for converting a third unit configured to convert a time difference between ultrasonic transmission time of the signal received from the ultrasonic transmitter and an arrival time of the expected ultrasonic signal into a measured distance.~~

8. (Currently amended) The ~~method apparatus~~ according to claim 5, wherein the output signal comprises a plurality of pulses, each of the pulses having a rising edge and a falling edge, and wherein the period of the output signal is a duration from the rising edge of one of the pulses to the rising edge of an immediately following one of the pulses.

9. (Previously presented) The method according to claim 1, further comprising steps of:

monitoring the output signal, which comprises a plurality of pulses; and

determining that an expected ultrasonic signal has arrived when at least predetermined number of pulses having a substantially similar width are identified; and

converting a time difference between ultrasonic transmission time of the signal received from the ultrasonic transmitter and an arrival time of the expected ultrasonic signal into a measured distance.

10. (Previously presented) The method according to claim 1, wherein the output signal comprises a plurality of pulses, each of the pulses having a rising edge and a falling edge, and wherein the period of the output signal is a duration from the rising edge of one of the pulses to the rising edge of an immediately following one of the pulses.

11. (Currently amended) A method of determining arrival of an ultrasonic wave, the method comprising:

receiving a signal through an ultrasonic sensor;
filtering a high-frequency component from the signal, thereby generating a filtered signal; and
comparing the filtered signal against a first threshold and a second threshold so as to provide an output signal having a first level and a second level different from the first level, the second threshold being lower than the first threshold,

wherein the output signal transitions from the first level to the second level when the filtered signal changes from below the first threshold to above the first threshold, and the output signal stays at the second level when the filtered signal maintains above the second threshold, and

wherein the output signal transitions from the second level to the first level when ~~or~~the filtered signal changes from above the second threshold to below the second threshold, and the output signal stays at the first level when the filtered signal maintains below the first threshold.

12. (Previously presented) The method according to claim 11, further comprising:

monitoring the output signal, which comprises a plurality of pulses; and
determining that an expected ultrasonic signal has arrived when at least predetermined number of pulses having a substantially similar width are identified.